

Screen deck maintenance for your gyrating sifter

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You’ve probably heard that a sifter is only as good as the screens it contains. So it should come as no surprise that keeping the machine’s screen decks in good shape will maximize your sifting capacity and efficiency. This article focuses on screen deck maintenance for one sifter type — the gyratory sifter. The author starts by describing the sifter’s operation and how to properly install the sifter, then outlines the monthly and yearly maintenance steps that will keep your gyratory sifter’s screen decks in peak condition.

A gyratory sifter (also called a *screener*, *classifier*, or *separator*) consists of a stack of multiple square, rectangular, or round screen decks, as shown in Figure 1. The screen decks are mounted on a stationary base that’s equipped with a drive mechanism. This article

concentrates on gravity-fed sifters, which have square or rectangular screen decks. [*Editor’s note:* Sifters with round screens decks are typically fed under pressure rather than gravity, a topic outside the scope of this article; however, many of the same maintenance principles discussed here also apply to sifters with round screen decks. For more information, see “For further reading” later in this article.]

Each screen deck consists of a heavy-duty frame that typically holds a pretensioned screen insert (also called a *screen panel*), as shown in Figure 2a. The screen insert consists of a screen cloth that’s stretched and attached to a lightweight frame, as shown in Figure 2b, to simplify the screen’s insertion into the screen deck frame. (In some gyratory sifters, the screen cloth is stretched and fastened directly to the screen deck frame.) The screen insert may also include a carrier

Figure 1

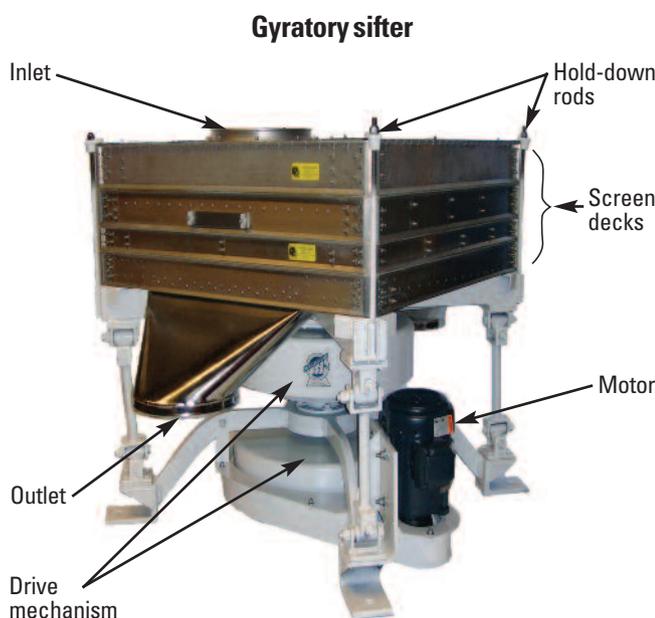


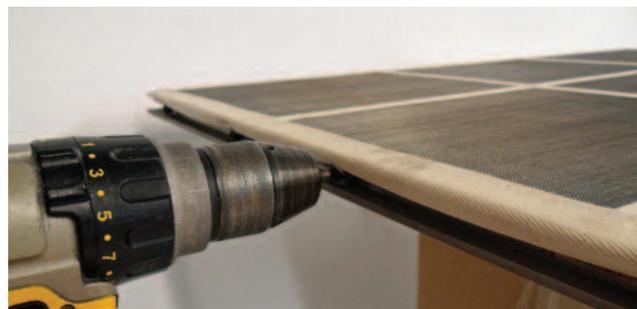
Figure 2

Screen insert

a. Typical screen insert



b. Attaching screen to insert frame



wire of coarse mesh mounted below the screen for holding a set of screen cleaners, such as plastic balls or cubes. A top cover with a material inlet is mounted on the top screen deck.

In operation, the sifter's drive mechanism — consisting of eccentric weights powered by an electric motor — imparts a low-frequency, high-amplitude gyratory motion to the screen decks, causing them to move in a gentle circular motion in a horizontal plane. After entering the inlet in the sifter's top cover, the material is immediately stratified by the gyratory motion. Fines are in contact with the first screen and begin to pass through. The fines that don't pass through the first screen flow along with the oversize onto the next screen. If a screen insert has screen cleaners, they bounce against the screen bottom, helping prevent near-size or sticky particles from clogging the screen openings. On-size particles flow through all the screens and discharge through the sifter outlet.

The gyratory sifter's screens are subject to a lot of mechanical stress and wear from the sifter's high-amplitude motion. This can enlarge the screen holes, resulting in off-spec final product, and eventually tear or otherwise damage the screen. Regularly inspecting, cleaning, and, when necessary, replacing the screen decks is the best way to keep your sifter performing as it should.

But before we talk about screen deck maintenance, let's explore an important preliminary step in minimizing required maintenance: correctly installing the sifter.

Properly installing the sifter

Before installing your gyratory sifter, be aware that the manufacturer dynamically balanced the sifter's drive mechanism for your application before the sifter left the factory. This ensures that the sifter will gyrate correctly for maximum screening efficiency in your process. Once the sifter arrives at your plant, *don't try to change the drive mechanism's balance, because even a slight imbalance can cause harmful vibrations and reduce the sifter's efficiency.*

Using the installation drawing supplied by the manufacturer, install the sifter by following these basic steps:

Choose a location with ample clearance. Make sure that you choose a spot for the sifter that allows ample clearance between it and any connecting spouts, hoppers, and conveyors so they can't impede the sifter's operation. The clearance should also keep the sifter's moving parts from contacting any stationary equipment or structures and allow easy access for changing the sifter's mechanical parts and screens.

Level the base. Install the sifter's stationary base, ensuring that it's perfectly level before mounting the sifter on it. A level base is crucial for maintaining the sifter's balance so it can achieve maximum screening capacity and efficiency.

Properly position the sifter on the base. Using a sling or similar device on a forklift or hoist, gently lower the sifter until one (or more) of its mounting feet just touches the base. Use a carpenter's level to ensure that the sifter is level, and then place shims under the mounting feet that aren't yet touching the base. When all the mounting feet are solidly on the base, check the level again and, when the sifter is level, bolt the sifter onto the base through the base and feet bolt holes. If the base and mounting feet bolt holes don't line up, *don't* force the mounting feet out of position; instead, relocate or enlarge the base holes to align with the feet holes.

Carefully attach flexible inlet and outlet connections. Use flexible tubes to connect the sifter's inlet and outlet to upstream and downstream equipment, but don't stretch the tubes so much that they become taut and can restrict the sifter's gyration. Secure both ends of each tube with the clamps provided with your sifter.

Properly install the sifter's external wiring. Use the wiring diagrams supplied by the sifter manufacturer to install the wiring from the sifter to the motor and motor starter. Ensure that the installed wiring conforms to the National Electrical Code (available as *NFPA 70: National Electrical Code*[2014] from the National Fire Protection Association at www.nfpa.org) and meets the requirements of the local electrical inspection agency with jurisdiction in your area.

Prepare the motor for operation. Before you start the motor for the first time, check that all wiring from the sifter to the motor and motor starter conforms to the wiring diagram. Also check that the voltage, phase, and frequency on the motor's nameplate match your line circuit's voltage, phase, and frequency. If you can, remove all external load on the motor and turn the motor's rotor by hand to make sure that it rotates freely. Before running the sifter with material, start the motor without a load and run it long enough to ensure that the sifter doesn't develop an unusual condition (such as a strange noise or wobbly or jerky gyration) that could mean the drive mechanism is out of balance.

Once the gyratory sifter is operating in your process, make sure that it's working correctly by performing two simple checks each day: First, visually inspect the sifter, both when it's idle and when it's operating, for leaks, loose hold-down rods, loose screen decks, jerky gyration, and other problems. Second, when the sifter is operating, check its gyratory motion by holding a felt-tip pen so that it lightly touches the sifter's top cover. The sifter's motion should cause the pen to draw a perfect circle on the cover. If the sifter loses contact with the pen or pushes it up, the sifter isn't shimmed properly or a bushing in the drive mechanism has failed.

Screen deck maintenance

The following information describes maintenance you should provide at monthly and yearly intervals to keep your

screen decks clean and in good working condition. *One note:* To minimize your sifter's downtime for repairs and the lost production that goes along with it, stock spare parts for the screen decks, including one set of screen inserts, one set of screen cleaners (if your sifter uses them), and one set of screen deck gaskets and sealing adhesive. (Consult the sifter manufacturer for advice about other spare parts to keep on hand for your sifter, such as hold-down rods and fasteners and drive mechanism components.)

Monthly maintenance. Once a month, clean the screen decks and inspect them for wear, following these steps:

Disassemble the screen deck stack. After you ensure that the material feed to the sifter has been stopped and that all material has been discharged from the sifter, stop the sifter. Remove the flexible tubes at the sifter inlet and outlet, then remove the hold-down rods (or similar devices) holding the screen decks on the sifter, and lift the top cover off. (Some gyratory sifters have a large side access door in the housing that allows individual screen decks to be removed without a need to disassemble the screen deck stack.) Starting at the top, remove each screen deck one at a time, carefully avoiding any damage to the screen deck frame or the screen insert. You should be able to easily remove each deck without using tools; if you must use tools, make sure that they can't damage or distort the screen deck. *Caution:* Never operate the sifter with the screen decks removed.

Clean and inspect the screen decks. Clean the screen decks one at a time. Use low-pressure compressed air or a soft brush to remove any loose material that has accumulated on the screen deck frame or screen insert. If necessary, remove the screen insert from each deck frame to thoroughly clean both the insert frame and screen. Be careful not to tamp or jar the insert frame or screen. Check the screen for tears, signs of blinding, and gaps between the screen edges and insert frame; if you find such problems, replace the screen insert. Clean any remaining material from the screen deck before placing the screen insert back into the deck.

Inspect and replace screen deck gaskets and seals. Inspect all gaskets and seals (such as lip seals) between the screen deck frames to be sure they're soft and flexible and not damaged or loose: The better the condition and surface smoothness of the gaskets and seals, the tighter the sifter will be sealed. If one gasket or seal is damaged or loose, replace all gaskets and seals on that deck frame and cement them with the adhesive designated in your sifter manual's parts list. When fitting gaskets on the deck frame, make sure that they butt together at the frame corners and are firmly cemented onto the frame.

Reassemble the screen deck stack. Reverse the stack disassembly steps, being careful to replace the screen decks in proper order. Again, the screen decks should fit into position easily without the use of tools to avoid damaging or

distorting the deck frames. Once the screen decks are back on the sifter, reattach the flexible tubes at the sifter inlet and outlet, but don't stretch them taut. Then tighten the nuts on all of the hold-down rods to the pressure specified by the sifter manufacturer.

Yearly maintenance. Perform these steps once a year:

Inspect the gaskets and seals. Disassemble the screen deck stack as previously described and inspect the gaskets and seals between the screen decks. Replace any hardened or damaged gaskets or seals. In general, expect to replace *all* screen deck gaskets and seals every 5 years if they haven't been replaced before that.

Inspect the screen deck frames. Check each screen deck frame for cracks and dents, and replace any cracked or severely dented side on a deck frame. Inspect all rivets on the deck frames and replace any that are damaged or loose. Check the screen deck corners for any sign of wear in the hole for the hold-down rod. If you find hole wear, the screen deck can't be tightened correctly and will slide around during sifter operation, destroying the gasket and expanding the hole for the rod, eventually causing the deck to fail.

Inspect the screen inserts. Remove the screen insert from each screen deck and inspect the insert frame and screen (and, if so equipped, the screen cleaners) for wear damage. To avoid a screen failure, it's best to replace all screen inserts and screen cleaners once a year. **PBE**

For further reading

Find more information on gyratory sifters and other sifting equipment in articles listed under "Screening and classifying" in *Powder and Bulk Engineering's* article index in the December 2013 issue or the Article Index at *PBE's* website, www.powderbulk.com.

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